

**WHAT IS CLAIMED IS:****1. A power feeding branching device comprising:**

a constant current-constant current converter having an input terminal, a first output terminal and a second output terminal which is electrically isolated from both said input terminal and said first output terminal; and

a controller connected to said constant current-constant current converter for making said constant current-constant current converter utilize a first constant current supplied to said input terminal to produce a second constant current and a restored first constant current which are to be supplied to said second output terminal and said first output terminal, respectively.

**2. A power feeding branching device as claimed in Claim 1 further comprising:**

a bypass circuit connected between said input terminal and said first output terminal for bypassing said constant current-constant current converter to allow the first constant current instead of said restored first constant current to flow from said input terminal to said first output terminal when said input terminal has an electrical potential higher than a predetermined potential.

**3. A power feeding branching device as claimed in Claim 1, wherein said constant current-constant current converter comprises:**

a transformer having primary and secondary windings;  
a square waveform producing portion connected to said input

terminal, said first output terminal, said primary winding and said controller for producing two square waveform currents from the first constant current in said primary winding under the control of said controller, said two square waveform currents being changed into the restored first constant current; and

a rectifying smoothing portion connected to said secondary winding and said second output terminal for rectifying and smoothing alternating current generated in said secondary winding to generate the second constant current.

4. A power feeding branching device as claimed in Claim 3, wherein said square waveform producing portion comprises:

a condenser connected to said input terminal and the midpoint of said first winding at one end thereof and to said first output at the other end thereof; and

two primary switches connected to ends of said first winding, said first output terminal and said controller for electrically connecting the ends of said first winding with said output terminal alternately according to the control of said controller.

5. A power feeding branching device as claimed in Claim 4, wherein said first winding of said transformer has a plurality of taps; and wherein said square waveform producing portion further comprises:

a plurality of additional switches connected to said taps, said primary switches and said controller for changing active length of said primary winding to vary turns ratio of said transformer.

6. A power feeding branching device as claimed in Claim

3, wherein said rectifying smoothing portion comprises:

two rectifying diodes connected between ends of said second winding and said second output terminal; and

a condenser connected to said second output terminal at one end thereof and to a midpoint of said secondary winding and a ground terminal at the other point thereof.

7. A power feeding branching device as claimed in Claim 1 further comprising:

a bypass diode connected between said second output terminal and a ground terminal.

8. A power feeding branching device as claimed in Claim 1 further comprising:

a resistor connected between said second output terminal and a ground terminal.

9. A power feeding branching device as claimed in Claim 1 further comprising:

a communication device connected to said controller for receiving a command signal transmitted from the outside to operate said controller.

10. A power feeding system including a plurality of trunk cables connected to feeding devices, a plurality of branch cables each of which is provided between adjacent two of said trunk cables, and a plurality of power feeding branching devices for connecting said branch cables with said trunk cables, wherein each of said power feeding branching devices comprises:

a constant current-constant current converter having an input terminal, a first output terminal and a second output terminal which is electrically isolated from both said input

terminal and said first output terminal; and

a controller connected to said constant current-constant current converter for making said constant current-constant current converter utilize a first constant current supplied to said input terminal to produce a second constant current and a restored first constant current which are to be supplied to said second output terminal and said first output terminal, respectively.

11. A power feeding system as claimed in Claim 10, wherein said power feeding branching devices are classified into two types, one of the types leading the second constant current from said constant current-constant current converter to said second output terminal, the other of the types leading the second constant current from said second output terminal to constant current-constant current converter, and wherein:

each of said branch cables is connected between two second output terminals of two of said power feeding branching devices different from each other in type.

12. A power feeding system as claimed in Claim 11, wherein said power feeding branching devices connect said branch cables with said trunk cables to form a lattice pattern.